WHAT IS CLAIMED IS:

1. A method of proliferating a precursor cell comprising modulating the expression of FRS3 in the precursor cell.

2. The method of claim 1 further comprising inducing the precursor cell to differentiate.

3. The method of claim 1 or claim 2 further comprising administering the precursor cell to a patient.

4. A method of treating a disorder characterized by the premature death or malfunction of a specific cell type comprising administering to a patient a precursor cell that is the precursor cell for the specific cell type and that has been proliferated by modulating the expression of FRS3 in the precursor cell.

5. The method of claim 4 further comprising inducing the precursor cell to differentiate prior to administering.

6. A method of treating a disorder characterized by the premature death or malfunction of a specific cell type comprising administering to a patient a precursor cell that is the precursor cell for the specific cell type, the precursor cell comprising a nucleic acid molecule encoding FRS3.

7. The method of claim 6 further comprising inducing the precursor cell to differentiate prior to administering.

8. The method of any one of claims 4 to 7 wherein the disorder is cancer, leukemia, Parkinson's disease, Alzheimer's disease, ALS, CNS damage, spinal cord injury, Multiple Sclerosis, cardiac damage, liver damage, kidney damage, pancreatic damage, retinal damage, intestinal damage, skeletal muscle damage, Muscular dystrophy, lung damage or diabetes.

9. The method of any one of claims 3 to 8 wherein the administering comprises surgical implantation or injection.

10. The method of any one of claims 1 to 9 wherein modulating the expression of FRS3 comprises increasing expression levels of native FRS3 in the precursor cell.

11. The method of any one of claims 1 to 9 wherein modulating the expression of FRS3 comprises expressing in the precursor cell a nucleic acid molecule encoding FRS3.

12. The method of claim 11 wherein modulating the expression of FRS3 further comprises transfecting the precursor cell with a vector comprising the nucleic acid molecule encoding FRS3.

13. The method of claim 12 wherein the vector is a retroviral vector, a lentiviral vector or an Adenoviral vector.

14. The method of any one of claims 1 to 13 wherein the precursor cell further comprises a nucleic acid encoding a therapeutic transgene or a therapeutic peptide.

15. The method of any one of claims 1 to 14 further comprising treating the precursor cell with an additional growth factor.

16. The method of claim 15 wherein the additional growth factor is fibroblast growth factor or a neurotrophin.

17. The method of any one of claims 1 to 16 wherein the FRS3 is human FRS3 or mouse FRS3.

18. The method of claim 17 wherein the FRS3 is selected from (i) a protein comprising the amino acid sequence of SEQ ID NO.:1 or SEQ ID NO.:2; (ii) a fragment of SEQ ID NO.:1 or SEQ ID NO.:2, the fragment possessing substantially the ability to

induce or enhance proliferation of the precursor cell or to cause the precursor cell to respond to growth factors; and (iii) an amino acid sequence possessing 90% identity to SEQ ID NO.:1 or SEQ ID NO.:2 and possessing substantially the ability to induce or enhance proliferation of the precursor cell or to cause the precursor cell to respond to growth factors.

19. The method of any one of claims 1 to 18 wherein the precursor cell is derived from neuronal tissue, peripheral blood, bone marrow, cardiac muscle, liver, retina, skeletal muscle, kidney, pancreatic, spleen, intestinal, lung, skin, umbilical cord cells including umbilical vein endothelial cells, or embryonic cells including embryonic stem cells.

20. A precursor cell comprising a nucleic acid molecule encoding FRS3.

21. The precursor cell of claim 20 further comprising a nucleic acid encoding a therapeutic transgene or a therapeutic peptide.

22. The precursor cell of claim 20 or claim 21 wherein the FRS3 is human FRS3 or mouse FRS3.

23. The precursor cell of claim 22 wherein the FRS3 is selected from (i) a protein comprising the amino acid sequence of SEQ ID NO.:1 or SEQ ID NO.:2; (ii) a fragment of SEQ ID NO.:1 or SEQ ID NO.:2, the fragment possessing substantially the ability to induce or enhance proliferation of the precursor cell or to cause the precursor cell to respond to growth factors; and (iii) an amino acid sequence possessing 90% identity to SEQ ID NO.:1 or SEQ ID NO.:2 and possessing substantially the ability to induce or enhance proliferation of the precursor cell or to cause the precursor cell to respond to growth factors.

24. The precursor cell of any one of claims 20 to 23 wherein the precursor cell is derived from neuronal tissue, peripheral blood, bone marrow, cardiac muscle, liver, retina, skeletal muscle, kidney, pancreatic, spleen, intestinal, lung, skin, umbilical

cord cells including umbilical vein endothelial cells, or embryonic cells including embryonic stem cells.

25. A progeny cell of the precursor cell of any one of claims 20 to 24 which has been induced to differentiate.

26. A pharmaceutical composition comprising the precursor cell of any one of claims 20 to 24 or the progeny cell of claim 25 and a pharmaceutically acceptable carrier.